

Genetic Engineering

John Carey

There are 2 possible ways to complete this worksheet:

OPTION A (more difficult): watch the video and make notes before you look at the following questions. Then try to answer the questions using the notes you have made.

OPTION B (easier): Read the following questions before you watch the video. Then close the question book, watch the video and make notes. Finally, re-open the question book and try to answer the questions using the notes you have made.

FOR BOTH OPTIONS, YOU SHOULD FAMILIARISE YOURSELF WITH THE VOCABULARY BELOW BEFORE YOU WATCH.

Key Vocabulary

Biotechnology – the use of microorganisms, such as bacteria or yeasts, or biological substances, such as enzymes, to perform specific industrial or manufacturing processes.

Manipulating – to move, arrange, operate, or control by hands or by mechanical means, especially in a skillful manner.

Cloning – a DNA sequence, such as a gene, that is transferred from one organism to another and replicated by genetic engineering techniques.

Organism – An individual form of life, such as plant, animal, bacterium, protest, or fungus.

Maize –the grains or kernels of this plant, used as food for humans and livestock or for the extraction of an edible oil or starch.

Pesticides – a chemical used to kill pests, especially insects.

Bird of prey – any of various predatory carnivorous birds such as the eagle or hawk.

Concentration – an increase in the strength of a fluid or gas in a mixture by purification, evaporation, or diffusion.

Species – a class of individuals or objects grouped by virtue of their common attributes and assigned a common name.

Bovine – relating to, or resembling a mammal such an ox, cow, or buffalo.

Therapeutic – having or exhibiting healing powers.

Section A: True/false

1. Genetic engineering comes under the heading biotechnology.
2. Genetic engineering is concerned with manipulating genetic material within a species but not between species.
3. Genetic manipulation is exclusive to food whereas cloning is involved in food, crops, animals and humans.
4. We share 70% to 80% of our genetic information with chimpanzees.

5. Because we share the same basic processes with other organisms it is possible to take DNA from one organism and put it into another organism.
6. Protein causes things to happen in living organisms.
7. European Corn Borer caterpillars destroy £19,000,000,000 of maize each year.
8. The best solution for dealing with the European Corn Borer caterpillars is using pesticides.

Section B: Comprehension questions

1. What is the best way of dealing with the European Corn Borer caterpillars?
2. What effect did the transgenic corn have on the Corn Borer?
3. What are the two reasons for resistance to GM food in the US?
4. What is a diabetic patient unable to produce?
5. How was diabetes treated until the 1920's?
6. Which discovery after the 1920's changed the treatment of diabetes?
7. From where did they initially take the insulin?
8. What was the problem with this type of insulin?
9. How was this problem resolved through genetic engineering?
10. What are the two types of cloning?
 - a.
 - b.
11. How is the genetic information retrieved in cloning?
12. Was the cloning of Dolly the sheep the first attempt at cloning an animal?
13. What problems did Dolly suffer?
 - a.
 - b.
14. In therapeutic cloning what is done to the cells before they are injected into the patient?
15. What did Christopher Reeves believe therapeutic cloning could achieve?
16. What example of the ethical issues that are raised by therapeutic cloning is given in the lecture?

17. What other questions are raised as issues for consideration?

- a.
- b.
- c.
- d.

Genetic Engineering

John Carey

There are 2 possible ways to complete this worksheet:

OPTION A (more difficult): watch the video and make notes before you look at the following questions. Then try to answer the questions using the notes you have made.

OPTION B (easier): Read the following questions before you watch the video. Then close the question book, watch the video and make notes. Finally, re-open the question book and try to answer the questions using the notes you have made.

FOR BOTH OPTIONS, YOU SHOULD FAMILIARISE YOURSELF WITH THE VOCABULARY BELOW BEFORE YOU WATCH.

Key Vocabulary

Biotechnology – the use of microorganisms, such as bacteria or yeasts, or biological substances, such as enzymes, to perform specific industrial or manufacturing processes.

Manipulating – to move, arrange, operate, or control by hands or by mechanical means, especially in a skillful manner.

Cloning – a DNA sequence, such as a gene, that is transferred from one organism to another and replicated by genetic engineering techniques.

Organism – An individual form of life, such as plant, animal, bacterium, protest, or fungus.

Maize –the grains or kernels of this plant, used as food for humans and livestock or for the extraction of an edible oil or starch.

Pesticides – a chemical used to kill pests, especially insects.

Bird of prey – any of various predatory carnivorous birds such as the eagle or hawk.

Concentration – an increase in the strength of a fluid or gas in a mixture by purification, evaporation, or diffusion.

Species – a class of individuals or objects grouped by virtue of their common attributes and assigned a common name.

Bovine – relating to, or resembling a mammal such an ox, cow, or buffalo.

Therapeutic – having or exhibiting healing powers.

Section A: True/false

1. Genetic engineering comes under the heading biotechnology. **TRUE**
2. Genetic engineering is concerned with manipulating genetic material within a species but not between species. **FALSE it also manipulates material between species.**
3. Genetic manipulation is exclusive to food whereas cloning is involved in food, crops, animals and humans. **TRUE**

4. We share 70% to 80% of our genetic information with chimpanzees.
FALSE We share 90% of our genetic information with chimpanzees.
5. Because we share the same basic processes with other organisms it is possible to take DNA from one organism and put it into another organism. **TRUE**
6. Protein causes things to happen in living organisms. **TRUE**
7. European Corn Borer caterpillars destroy £19,000,000,000 of maize each year.
FALSE £19,000,000,000 of maize is grown each year and the caterpillars destroy 7% of it.
8. The best solution for dealing with the European Corn Borer caterpillars is using pesticides. **FALSE The pesticides are expensive, difficult to apply and are not always effective.**

Section B: Comprehension questions

1. What is the best way of dealing with the European Corn Borer caterpillars? **It is better to have another organism that eats the Corn Borer larvae as its prey.**
2. What effect did the transgenic corn have on the Corn Borer? **It disrupted the lining of its intestine.**
3. What are the two reasons for resistance to GM food in the US?
 - (i) **Genetic manipulations become more concentrated as they move up the food chain and as a result may affect something at the top of the chain.**
 - (ii) **There is competition between organisms and creating new species through genetic manipulation and a new species might be more successful and disadvantage the normal natural species.**
4. What is a diabetic patient unable to produce? **Insulin**
5. How was diabetes treated until the 1920's? **It was not treated. It was a fatal disease.**
6. Which discovery after the 1920's changed the treatment of diabetes?
Insulin, which is a protein, was found to be the cause, and it was found that it could be injected into humans.
7. From where did they initially take the insulin? **Cattle and Pigs.**
8. What was the problem with this type of insulin? **People reacted to it.**
9. How was this problem resolved through genetic engineering? **Eventually they identified which gene produced insulin in humans and snipped it out. This gene was then put into bacteria that reproduced the insulin by doubling it**

every 20 minutes. The bacteria produced human insulin, which can be extracted and injected into humans.

10. What are the two types of cloning?
 - a. **reproductive**
 - b. **therapeutic**

11. How is the genetic information retrieved in cloning? **A hole is made in the egg cell and the genetic information is removed from the nucleus.**

12. Was the cloning of Dolly the sheep the first attempt at cloning an animal? **No, it was a success after a long series of failed experiments.**

13. What problems did Dolly suffer?
 - a. **premature ageing**
 - b. **diseases associated with older sheep**

14. In therapeutic cloning what is done to the cells before they are injected into the patient? **They are treated with chemicals.**

15. What did Christopher Reeves believe therapeutic cloning could achieve? **He believed it would be possible to clone healthy cells and inject them into patients with spinal cord injuries and that this could bring about repair.**

16. What example of the ethical issues that are raised by therapeutic cloning is given in the lecture? **In the UK a couple had a child with a rare disease. They decided to have another child so that they could get some stem cells from that child's placenta in order to cure the child that was ill. This could be seen as having a child as a spare part.**

17. What other questions are raised as issues for consideration?
 - a. **Can you patent humans?**
 - b. **Should you be able to profit from therapeutic cloning?**
 - c. **Would it be available to those in rich countries only?**
 - d. **Since science is international but laws on science differ from country to country, what are the legal implications of cloning?**